Table 7-9. Estimated Willingness-to-pay to Avoid Morbidity Effects for One Symptom Day (1995 dollars)

Health Endpoint	Low ($)	Mid-Range ($)	High ($)
Eye Irritation[1]	20.79	20.79	46.14
Headache[2]	1.67	13.23	66.72
Nausea[1]	29.11	29.11	83.66
Asthma Attack[3]	15.62	42.96	71.16

Sources:

[1] Tolley, G.S., et al. 1986. *Valuation of Reductions in Human Health Symptoms and Risks*. University of Chicago. Final Report for the U.S. EPA. January. As cited in Unsworth, Robert E. and James E. Neumann, Industrial Economics, Incorporated, Memorandum to Jim DeMocker, Office of Policy Analysis and Review, *Review of Existing Value of Morbidity Avoidance Estimates: Draft Valuation Document*. September 30, 1993.

[2] Dickie, M., et al. 1987. *Improving Accuracy and Reducing Costs of Environmental Benefit Assessments*. U.S. EPA, Washington, DC, September, and Tolley, G.S., et al. 1986. *Valuation of Reductions in Human Health Symptoms and Risks*. University of Chicago. Final Report for the U.S. EPA. January. As cited in Unsworth, Robert E. and James E. Neumann, Industrial Economics, Incorporated, Memorandum to Jim DeMocker, Office of Policy Analysis and Review, *Review of Existing Value of Morbidity Avoidance Estimates: Draft Valuation Document*. September 30, 1993.

[3] Rowe, R.D. and L.G. Chestnut. 1986. *Oxidants and Asthmatics in Los Angeles: A Benefit Analysis*. Energy and Resource Consultants, Inc. Report to U.S. EPA, Office of Policy Analysis, EPA-230-07-85-010. Washington, DC March 1985. Addendum March 1986. As cited in Unsworth, Robert E. and James E. Neumann, Industrial Economics, Incorporated, Memorandum to Jim DeMocker, Office of Policy Analysis and Review, *Review of Existing Value of Morbidity Avoidance Estimates: Draft Valuation Document*. September 30, 1993.

7.3 OVERVIEW OF RISK, COST AND PERFORMANCE

This section gives an overview of the substitute blanket washes including information regarding performance, cost, risk and exposure, and regulatory concerns. Since these evaluation factors are unique to each formulation, an individual profile was developed for each of the substitute blanket washes. The results of the process safety and general population risk analyses are similar for all formulations (see Sections 3.5 and 3.4.4, respectively). The profile summarizes information from various sections of the CTSA as described below.

Chemical Information

The generic chemical composition of each substitute blanket wash is provided. The categorization of blanket wash chemicals used to genericize the formulations was described in detail in Section 2.1. Also included in each profile are the flash point, VOC content, and pH of each substitute wash, which were determined during laboratory testing by the Graphic Arts Technical Foundation (GATF) (see also Table 4-1).

Performance

The performance section of the profile summarizes information collected during laboratory and production run performance demonstrations with each substitute blanket wash. The data on

wipability and blanket swell were determined in laboratory evaluations conducted by the GATF (see also Table 4-1).

Wipability is based on the number of strokes required to remove a standard volume of either wet or dry ink from the test blanket using a measured volume of the substitute blanket wash. Washes for which more than 100 strokes were required to clean the blanket were eliminated from field testing. The blanket swelling potential of each substitute wash was determined by measuring the thickness of the test blanket before and after exposure to the substitute blanket wash for one and five hours. Washes for which the blanket swell exceeded 3 percent after 5 hours were eliminated from field testing.

Based on the laboratory test results, 22 products qualified for further evaluation through field demonstrations. Each of the 22 substitutes was demonstrated at two facilities, and performance was compared to a standard baseline wash (VM&P naphtha). Qualitative performance evaluations were made by DfE observers and printers at the test facilities (see also Table 4-2).

Cost

A cost analysis was conducted for the 22 field-tested substitute blanket washes and the baseline wash. The primary source of information for the cost estimates was the performance demonstrations. The specific assumptions and methodology used in the analysis are discussed in detail in Section 4.2. In general, the data for cost per wash were based on estimates for labor, blanket wash, and material costs. The cost per press was calculated by multiplying the cost per wash by the estimated number of blankets per press. The annual cost was calculated by multiplying the total cost per press by the number of washes per shift, the number of shifts per week, and the number of weeks worked per year. The percent change refers to the percent increase or decrease that the facility would incur if it switched from using the baseline (VM&P naphtha) to using the substitute blanket wash. These data were extracted from Table 4-3. The number of times the blanket wash was used by the printing facility provides the number of data points, i.e., the sample size.

Risk and Exposure

This section of the profile addresses the risks that may result from the substitute blanket washes under typical conditions of use. The risk characterization integrates hazard and exposure information into quantitative and qualitative expressions of risk. The specific assumptions and methodology used to estimate occupational exposure are described in detail in Section 3.2. The risk characterization methodology is discussed in detail in Section 3.4.1 and 3.4.3.

Separate risk estimates are presented for dermal and inhalation exposure. Most of the formulations (27 of the 37 formulations including the baseline) present at least some concern for dermal exposures to workers primarily due to relatively high potential exposure levels. In contrast, worker inhalation risks are very low for almost all of the formulations, reflective of the generally low exposure levels.

Flammability risks are defined as follows: 1) High Risk: products with a flash point less than 100°F; 2) Moderate Risk: products with a flash point greater than 100° F but less than 150° F; and Low Risk: products with a flash point greater than 150°F.

Environmental risks are also presented. Only those formulations containing alkyl benzene sulfonates or ethoxylated nonylphenols presented a possible risk to aquatic species. The methodology and specific results can be found in Section 3.4.2.

Regulatory Concerns

This section identifies the substitute blanket washes that may trigger federal environmental regulations. Discharges of blanket wash chemicals may be restricted by air, water, and solid waste regulations; in addition, facilities may be required to report releases of some blanket wash products. It is important to note that this analysis is based on the generic chemical composition. Specific blanket wash chemicals that trigger federal environmental regulations (and one occupational health regulation) are given in Table 2-6. They are:

- Clean Water Act (CWA)
- Clean Air Act (CAA), Section 112B - Hazardous Air Pollutants
- Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)
- Superfund Amendments and Reauthorization Act (SARA), Section 313
- Superfund Amendments and Reauthorization Act (SARA), Section 104
- Resource Conservation and Recovery Act (RCRA)
- Occupational Safety and Health Act (OSHA)

The generic category for these chemicals (based on Table 2-1) was compared to the generic compositions of the substitute blanket washes.

Blanket Wash Formulation 1

Composition:
Fatty acid derivatives
Alkoxylated alcohols

VOC Content: 30%; 2.3 lbs/gal
Flashpoint: 230+°F
pH: 7.8 (fluctuates wildly)

Performance

Wipability: wet ink- 4 strokes
dry ink- 6 strokes

Blanket swell: 1 hr.- 1.5%
5 hrs.- 3.0%

The performance of Blanket Wash 1 was demonstrated at two facilities. Facility 3 based their performance evaluation on a sample size of ten blanket washes and printed with conventional inks. This facility found that the wash yielded good performance for light or medium ink coverage but poor performance for heavy ink coverage. The extra time and effort required for heavy ink coverage were unacceptable. The wash also left a slight residue that was removed with a dry rag.

Facility 6 based their performance evaluation on a sample size of four blanket washes and printed with conventional inks. This facility found that the wash yielded poor performance, and resulted in print quality problems. The image of the previous job was still showing. Facility 6 did not use alternative product 1 for the full week-long demonstration, discontinuing use after experiencing print quality problems believed to have been attributable to use of the alternative product.

Cost

The results of the performance demonstration indicate an increased financial cost when using Blanket Wash 1 instead of the baseline product at both facilities 3 and 6. Performance results indicate a 25 percent increase and a 70 percent increase in cleaning times at facilities 3 and 6, respectively. The costs associated with product use (i.e., volume x price) are also significantly higher for Blanket Wash 1 when compared to the baseline, driven primarily by the product's high price. The manufacturer's price for product 1 is $20/gallon versus $5.88/gallon for the baseline product. Costs associated with product use increased roughly 220 percent and 160 percent for facilities 3 and 6, respectively.

Facility #	Cost/Wash	Cost/Press	Annual Cost*	Baseline Cost*	% Change**
3	$0.69	$2.76	$6,900.00	$5,500.00	+25
6	$0.87	$3.48	$8,700.00	$4,600.00	+89

* These costs refer to the cost/press/shift/year
** Refers to the percent increase or decrease in cost that this facility would incur if it switched from using VM&P naphtha to using Blanket Wash 1. A "+" indicates an increase in cost, and a "-" indicates a decrease.

Risk and Exposure

Risks for this formulation could not be quantified due to the unavailability of hazard values. However, overall concern is low because of low inhalation exposure levels, poor dermal absorption, and low to moderate toxicologic concern based on structure-activity analysis.

Flammability: Low risk

Environmental: No measured risk

Regulatory Concerns

None of the chemical categories present in this blanket wash contain chemicals that may trigger specific federal environmental regulation.

Blanket Wash Formulation 3

Composition:
Hydrocarbons, petroleum distillates
Fatty acid derivatives
Hydrocarbons, aromatic
Alkyl benzene sulfonates

VOC Content: 91%; 6.4 lbs/gal
Flashpoint: 114°F
pH: 3.4 (fluctuates wildly)

Performance

Wipability:	wet ink- 4 strokes	Blanket swell: 1 hr.- 1.5%
	dry ink- 4 strokes	5 hrs.- 4.5%

The performance of Blanket Wash 3 was not demonstrated at any facilities.

Cost

Cost estimates associated with using Blanket Wash 3 were not developed.

Risk and Exposure

Dermal Exposure: Hazard quotient calculations indicate a concern for exposure to some aromatic hydrocarbons and very low concern for exposure to other aromatic hydrocarbons. However, the hazard values are based upon oral or inhalation studies. Margin of exposure calculations indicate concern for exposures to aromatic hydrocarbons. However, the hazard values are based upon inhalation studies. Risks for other chemicals in this formulation could not be quantified due to the unavailability of hazard values.

Inhalation Exposure: Hazard quotient calculations indicate very low concern for exposure to aromatic hydrocarbons. However, the hazard value for one of these aromatic hydrocarbons is based upon an oral study. The RfD used to calculate the risk estimate is classified as "low confidence" by IRIS (Integrated Risk Information System). Margin of exposure calculations indicate concern for exposure to certain aromatic hydrocarbons, but very low concern for exposure to others. Due to negligible inhalation exposure, the alkyl benzene sulfonates and fatty acid derivatives used in this formulation present no concern. Risks for other chemicals in the formulation could not be quantified due to the unavailability of hazard values.

Flammability: Moderate risk

Environmental: Aquatic species risk is due to the presence of alkyl benzene sulfonates.

Regulatory Concerns

The following table indicates which chemical categories present in this blanket wash contain chemicals that may trigger specific federal environmental regulation.

Chemical	CWA	CAA	CERCLA	SARA 313	RCRA	OSHA
Hydrocarbons, aromatic	X	X	X	X	X	X
Alkyl benzene sulfonates	X		X			

Blanket Wash Formulation 4

Composition:
Terpenes
Ethoxylated nonylphenol

VOC Content: 89%; 6.4 lbs/gal
Flashpoint: 114°F
pH: 8.7

Performance

Wipability: wet ink- 3 strokes
dry ink- 2 strokes

Blanket swell: 1 hr.- 3.0%
5 hrs.- 5.2%

The performance of Blanket Wash 4 was not demonstrated at any facilities.

Cost

Cost estimates associated with using Blanket Wash 4 were not developed.

Risk and Exposure

Dermal Exposure: Margin of exposure calculations indicate concern for exposure to terpenes and low concern for exposure to ethoxylated nonylphenols. However, the hazard value for terpenes is based upon an oral study.

Inhalation Exposure: Margin of exposure calculations indicate a very low concern for exposure to terpenes. However, the hazard value is based upon an oral study. Due to negligible exposure, no concern exists for exposure to the ethoxylated nonylphenols.

Flammability: Moderate risk

Environmental: Aquatic species risk due to presence of ethoxylated nonylphenols.

Regulatory Concerns

None of the chemical categories present in this blanket wash contain chemicals that may trigger specific federal environmental regulation.

Blanket Wash Formulation 5

Composition:
Water
Hydrocarbons, aromatic
Ethylene glycol ethers
Ethoxylated nonylphenol
Alkyl benzene sulfonates
Alkoxylated alcohols
Alkali/salts

VOC Content: 30%; 2.5 lbs/gal
Flashpoint: 139°F
pH: 4.3

Performance

Wipability: wet ink- 9 strokes
dry ink- 8 strokes

Blanket swell: 1 hr.- 6.1%
5 hrs.- 15.4%

The performance of Blanket Wash 5 was not demonstrated at any facilities.

Cost

Cost estimates associated with using Blanket Wash 5 were not developed.

Risk and Exposure

Dermal Exposure: Margin of exposure calculations indicate concern for exposures to aromatic hydrocarbons and ethylene glycol ethers, and very low concern for exposure to ethoxylated nonylphenols. However, the hazard value for aromatic hydrocarbons is based upon an inhalation study. Risks for other chemicals in this formulation could not be quantified due to the unavailability of hazard values.

Inhalation Exposure: Margin of exposure calculations indicate very low concern for exposure to aromatic hydrocarbons and ethylene glycol ethers. Due to negligible exposure, no concern exists for the other chemicals in this formulation.

Flammability: Moderate risk

Environmental: Aquatic species risk is due to the presence of alkyl benzene sulfonates and ethoxylated nonylphenols.

Regulatory Concerns

The following table indicates which chemical categories present in this blanket wash contain chemicals that may trigger specific federal environmental regulation.

Chemical	CWA	CAA	CERCLA	SARA 313	RCRA	OSHA
Hydrocarbons, aromatic	X	X	X	X	X	X
Ethylene glycol ethers		X		X		
Alkyl benzene sulfonates	X		X			

Blanket Wash Formulation 6

Composition:
Fatty acid derivatives
Hydrocarbons, petroleum distillates
Solvent naphtha (petroleum), heavy aromatic
Alkyl benzene sulfonates

VOC Content: 47%; 3.5 lbs/gal
Flashpoint: 152°F
pH: 5.5

Performance

Wipability: wet ink- 8 strokes
dry ink- 6 strokes

Blanket swell: 1 hr.- 0.7%
5 hrs.- 1.5%

The performance of Blanket Wash 6 was demonstrated at two facilities. Facility 11 based their performance evaluation on a sample size of 11 blanket washes and printed with conventional and vegetable-based inks. This facility found that the wash left an oily residue that interfered with print quality. Due to its thick consistency, the wash did not readily absorb into rags creating delays. In addition, this facility found that more effort was required with heavy ink coverage. This facility felt that Blanket Wash 6 yielded fair performance results overall.

Facility 15 based their performance evaluation on a sample size of 23 blanket washes and printed with conventional inks. This facility also noted that the blanket wash did not readily absorb into rags due to its thick consistency. This created delays in cleaning, and prompted this facility to rate the cleaning effort as "high." However, this facility felt that Blanket Wash 6 cut the ink well and did not leave a residue on the blanket.

Cost

The results of the performance demonstration indicate an increased financial cost when using Blanket Wash 6 instead of the baseline. Costs for facilities 11 and 15 increased roughly 20 percent and 50 percent respectively when using Blanket Wash 6 instead of the baseline. Performance results indicate an 11 percent increase and a 69 percent increase in cleaning times at facilities 11 and 15, respectively. Despite a 30 percent decrease in the average quantity of blanket wash used, facility 15 experienced a 60 percent increase in costs associated with blanket wash use (i.e., volume x price) due to a product cost of more than twice the baseline cost ($12.35/gallon for product 6 compared to $5.88/gallon for the baseline product). Facility 11 experienced a 20 percent increase in product use, with a subsequent increase of 170 percent in costs associated with product use.

Facility #	Cost/Wash	Cost/Press	Annual Cost*	Baseline Cost*	% Change**
11	$0.82	$3.28	$8,200	$7,000	+17
15	$0.77	$3.08	$7,700	$5,000	+54

* These costs refer to the cost/press/shift/year
** Refers to the percent increase or decrease in cost that this facility would incur if it switched from using VM&P naphtha to using Blanket Wash 6. A "+" indicates an increase in cost, and a "-" indicates a decrease.

Risk and Exposure

Dermal Exposure: Margins of exposure calculations indicate concern for exposure to petroleum distillate hydrocarbons. However, the hazard value is based upon inhalation studies. Risks for other chemicals in the formulation could not be quantified due to the unavailability of hazard values. Structure-activity analysis indicates a moderate hazard concern for aromatic hydrocarbons due to the possible presence of carcinogenic compounds. The fatty acid derivatives and alkyl benzene sulfonates are of low concern due to their expected low rate of dermal absorption and low to moderate hazard.

Inhalation Exposure: Margin of exposure calculations indicate very low concern for exposure to petroleum distillate hydrocarbons. Due to low or negligible inhalation exposures, the petroleum distillate hydrocarbons, alkyl benzene sulfonates, and fatty acid derivatives used in this formulation present little or no concern.

Flammability: Low risk

Environmental: Aquatic species risk is due to the presence of alkyl benzene sulfonates.

Regulatory Concerns

The following table indicates which chemical categories present in this blanket wash contain chemicals that may trigger specific federal environmental regulation.

Chemical	CWA	CAA	CERCLA	SARA 313	RCRA	OSHA
Hydrocarbons, aromatic	X	X	X	X	X	X
Alkyl benzene sulfonates	X		X			

Blanket Wash Formulation 7

Composition:
Terpenes
Ethoxylated nonylphenol
Alkoxylated alcohols

VOC Content: 36%; 3.0 lbs/gal
Flashpoint: 165°F
pH: 9.3

Performance

Wipability: wet ink- 6 strokes
dry ink- 8 strokes

Blanket swell: 1 hr.- 3.8%
5 hrs.- 6.8%

The performance of Blanket Wash 7 was not demonstrated at any facilities.

Cost

Cost estimates associated with using Blanket Wash 7 were not developed.

Risk and Exposure

Dermal Exposure: Margin of exposure calculations indicate concern for exposure to terpenes and very low concern for exposure to ethoxylated nonylphenol. However, the hazard value for terpenes is based upon an oral study. Risks for other chemicals in this formulation could not be quantified due to the unavailability of hazard values, although none of the chemicals present more than a low to moderate hazard concern based on structure-activity analysis.

Inhalation Exposure: Margin of exposure calculations indicate very low concern for exposure to terpenes. However, the hazard value is based upon an oral study. Due to low or negligible inhalation exposures, other chemicals in the formulation present little or no concern.

Flammability: Low risk

Environmental: Aquatic species risk due to the presence of ethoxylated nonylphenols.

Regulatory Concerns

None of the chemical categories present in this blanket wash contain chemicals that may trigger specific federal environmental regulation.

Blanket Wash Formulation 8

Composition:
Water
Hydrocarbons, aromatic
Propylene glycol ethers
Alkyl benzene sulfonates
Ethoxylated nonylphenol
Alkoxylated alcohols
Alkali/salts

VOC Content: 41%; 3.3 lbs/gal
Flashpoint: 115°F
pH: 4.0

Performance

Wipability:	wet ink- 7 strokes	Blanket swell: 1 hr.- 7.7%
	dry ink- 9 strokes	5 hrs.- 20%

The performance of Blanket Wash 8 was not demonstrated at any facilities.

Cost

Cost estimates associated with using Blanket Wash 8 were not developed.

Risk and Exposure

Dermal Exposure: Margin of exposure calculations indicate concern for propylene glycol ethers and very low concern for ethoxylated nonylphenol. Risks for other chemicals in this formulation could not be quantified due to the unavailability of hazard values. Structure-activity analysis indicated a moderate hazard concern for aromatic hydrocarbons due to the possible presence of carcinogenic compounds. The other compounds in the formulation present low to moderate hazard concerns.

Inhalation Exposure: Margin of exposure calculations indicate very low concern for propylene glycol ethers. However, the hazard value is based upon a subacute oral study. Due to low or negligible inhalation exposure, other chemicals in the formulation present little or no concern.

Flammability: Moderate risk

Environmental: Aquatic species risk is due to the presence of alkyl benzene sulfonates and ethoxylated nonylphenols.

Regulatory Concerns

The following table indicates which chemical categories present in this blanket wash contain chemicals that may trigger specific federal environmental regulation.

Chemical	CWA	CAA	CERCLA	SARA 313	RCRA	OSHA
Hydrocarbons, aromatic	X	X	X	X	X	X
Alkali/salts	X		X			
Alkyl benzene sulfonates	X		X			

Blanket Wash Formulation 9

Composition:
Fatty acid derivatives
Water
Ethoxylated nonylphenol

VOC Content: 10%; 0.77 lbs/gal
Flashpoint: 230+°F
pH: 4.6

Performance

Wipability: wet ink- 19 strokes
dry ink- 30 strokes

Blanket swell: 1 hr.- 1.5%
5 hrs.- 1.5%

The performance of Blanket Wash 9 was demonstrated at two facilities. Facility 10 based their performance evaluation on a sample size of four blanket washes and printed with conventional inks. This facility found that the wash yielded poor performance overall. The wash did not cut ink well, required excessive effort for cleaning, and did not soak into the rag. For these reasons, this facility discontinued using Blanket Wash 9 after four washes.

Facility 15 based their performance evaluation on a sample size of 21 blanket washes and printed with conventional inks. This facility also found that the wash yielded poor performance and that the wash did not soak into the rag. This facility felt that using Blanket Wash 9 required much more effort than using the baseline.

Cost

Blanket washing costs increase significantly when using Blanket Wash 9 as compared to the baseline product at facilities 10 and 15. Costs increased 129 percent and 84 percent at facilities 10 and 15 respectively when compared to the baseline. Performance data indicate that increased cleaning times are the driving force behind the cost increases experienced by both facilities. Cleaning times increase 175 percent and 129 percent when compared to the baseline at facilities 10 and 15, respectively.

Facility #	Cost/Wash	Cost/Press	Annual Cost*	Baseline Cost*	% Change**
10	$2.08	$8.32	$20,800	$9,100	+129
15	$0.92	$3.68	$9,200	$5,000	+84

* These costs refer to the cost/press/shift/year
** Refers to the percent increase or decrease in cost that this facility would incur if it switched from using VM&P naphtha to using Blanket Wash 9. A "+" indicates an increase in cost, and a "-" indicates a decrease.

Risk and Exposure

Dermal Exposure: Margin of exposure calculations indicate a very low concern for ethoxylated nonylphenol. Risks for the fatty acid derivative could not be quantified but is expected to be very low based on structure-activity predictions of low toxicity and poor dermal absorption.

Inhalation Exposure: Due to negligible inhalation exposure, the chemicals used in this formulation present no concern.

Flammability: Low risk

Environmental: Aquatic species risk due to the presence of ethoxylated nonylphenols.

Regulatory Concerns

None of the chemical categories present in this blanket wash contain chemicals that may trigger specific federal environmental regulation.

Blanket Wash Formulation 10

Composition:
Fatty acid derivatives
Water

VOC Content: 2%; 0.16 lbs/gal
Flashpoint: 230+°F
pH: 5.7

Performance

Wipability: wet ink- 12 strokes
dry ink- 13 strokes

Blanket swell: 1 hr.- 0.7%
5 hrs.- 0.7%

The performance of Blanket Wash 10 was demonstrated at two facilities. Both facilities 3 and 4 based their performance evaluation on a sample size of four blanket washes and printed with conventional inks. Both facilities declined to further test the blanket wash due to the level of effort required to clean the blankets. Blanket Wash 10 did not absorb well into the rags and did not cut ink well at either facility.

Cost

Performance data indicate mixed results in the performance of Blanket Wash 10. Blanket washing costs increased 4 percent at facility 3 and 160 percent at facility 4 when Blanket Wash 10 is used rather than the baseline.

Facility #	Cost/Wash	Cost/Press	Annual Cost*	Baseline Cost*	% Change**
3	$0.57	$2.28	$5,700	$5,500	+4
4	$2.20	$8.80	$22,000	$8,500	+159

* These costs refer to the cost/press/shift/year
** Refers to the percent increase or decrease in cost that this facility would incur if it switched from using VM&P naphtha to using Blanket Wash 10. A "+" indicates an increase in cost, and a "-" indicates a decrease.

Risk and Exposure

Dermal Exposure: Risk for this formulation could not be quantified but is expected to be very low based on structure-activity predictions of low toxicity and poor dermal absorption of the fatty acid derivatives.

Inhalation Exposure: Due to negligible exposure, the fatty acid derivatives used in this formulation present no concern.

Flammability: Low risk

Environmental: No measured risk

Regulatory Concerns

None of the chemical categories present in this blanket wash contain chemicals that may trigger specific federal environmental regulation.

Blanket Wash Formulation 11

Composition:
Fatty acid derivatives
Hydrocarbons, petroleum distillates
Hydrocarbons, aromatic
Alkyl benzene sulfonates

VOC Content: 61%; 4.3 lbs/gal
Flashpoint: 150°F
pH: 5.0 (fluctuates wildly)

Performance

Wipability: wet ink- 4 strokes
dry ink- 5 strokes

Blanket swell: 1 hr.- 0.0%
5 hrs.- 1.5%

The performance of Blanket Wash 11 was demonstrated at two facilities. Facility 1 based their performance evaluation on a sample size of 26 blanket washes and printed with vegetable-based inks. This facility found that the blanket wash yielded good performance results from light to medium ink coverage, but poor performance results for heavy ink coverage due to the extra time and effort required. This facility found that the blanket wash left a slight, oily residue on the blanket, although this did not affect the print quality.

Facility 2 based their performance evaluation on a sample size of 31 blanket washes and printed with conventional and vegetable-based inks. This facility found that the blanket wash yielded good to fair performance results for light to medium ink coverage but poor performance for heavy ink coverage due to the extra product, time and effort required. This facility also found that the blanket wash left a slight, oily residue on the blanket which did not affect the print quality.

Cost

The results of the performance demonstration indicate an increased financial cost when using Blanket Wash 11 instead of the baseline. Overall costs per wash at facilities 1 and 2 increased roughly 120 percent and 30 percent respectively when using Blanket Wash 11 instead of the baseline. Costs associated with product use (i.e., volume x price) are driven by the higher price of Blanket Wash 11 as compared to the baseline. Blanket Wash 11 is priced at $12.15/gallon compared to $5.88/gallon for the baseline product. Material costs (i.e., press wipes) increased by roughly 210 percent and 140 percent at facility 1 and 2, respectively.

Facility #	Cost/Wash	Cost/Press	Annual Cost*	Baseline Cost*	% Change**
1	$1.29	$5.16	$12,900	$5,900	+119
2	$0.68	$2.72	$6,800	$5,300	+28

* These costs refer to the cost/press/shift/year
** Refers to the percent increase or decrease in cost that this facility would incur if it switched from using VM&P naphtha to using Blanket Wash 11. A "+" indicates an increase in cost, and a "-" indicates a decrease.

Risk and Exposure

Dermal Exposure: Margin of exposure calculations indicate concern for exposure to the petroleum distillate hydrocarbons. However, the hazard value is based upon an inhalation study. Risks for the other chemicals in this formulation could not be quantified due to the unavailability of hazard values.

Structure-activity analysis indicates a moderate hazard concern for aromatic hydrocarbons due to the possible presence of carcinogenic compounds. The alkyl benzene sulfonates are of low concern due to their expected low rate of dermal absorption and low to moderate hazard.

Inhalation Exposure: Margin of exposure calculations indicate very low concern for exposure to petroleum distillate hydrocarbons. Due to low or negligible inhalation exposures, other chemicals in the formulation present little or no concern.

Flammability: Low risk

Environmental: Aquatic species risk is due to the presence of alkyl benzene sulfonates.

Regulatory Concerns

The following table indicates which chemical categories present in this blanket wash contain chemicals that may trigger specific federal environmental regulation.

Chemical	CWA	CAA	CERCLA	SARA 313	RCRA	OSHA
Hydrocarbons, aromatic	X	X	X	X	X	X
Alkyl benzene sulfonates	X		X			

Blanket Wash Formulation 12

Composition:
Hydrocarbons, petroleum distillates
Water

VOC Content: 20%; 1.3 lbs/gal
Flashpoint: 125°F
pH: 8.2

Performance

Wipability: wet ink- 7 strokes
dry ink- 11 strokes

Blanket swell: 1 hr.- 0.0%
5 hrs.- 1.5%

The performance of Blanket Wash 12 was demonstrated at two facilities. Facility 12 based their performance evaluation on a sample size of 16 blanket washes and printed with conventional inks. The wash was diluted 50% with water. This facility noted that the wash caused potential print quality problems. This facility also found that the wash had difficulty cutting paper residue and discontinued use of the wash on paper residue coated blankets. Nevertheless, the wash was considered equal to baseline in overall performance.

Facility 13 based their performance evaluation on a sample size of 19 blanket washes and printed with conventional inks. This facility considered the overall performance of the wash to be fair across ink coverages and dilutions. When not diluted with water, performance surpassed baseline and standard washes. The wash required slightly less effort than the baseline wash when averaged over all dilution levels.

Cost

The results of the performance demonstration indicate an increased financial cost when using Blanket Wash 12 instead of the baseline. Average costs per wash increased roughly 20 percent and 5 percent at facilities 12 and 13, respectively. At a cost of $16.40/gallon, however, Blanket Wash 12 would not be economically competitive with the baseline ($5.88/gallon) unless the average quantity used was significantly lower.

Facility #	Cost/Wash	Cost/Press	Annual Cost*	Baseline Cost*	% Change**
12	$0.99	$3.96	$9,900	$8,100	+22
13	$0.83	$3.32	$8,300	$8,000	+4

* These costs refer to the cost/press/shift/year
** Refers to the percent increase or decrease in cost that this facility would incur if it switched from using VM&P naphtha to using Blanket Wash 12. A "+" indicates an increase in cost, and a "-" indicates a decrease.

Risk and Exposure

Dermal Exposure: Margin of exposure calculations indicate concern for petroleum distillate hydrocarbons. However, the hazard value is based upon an inhalation study. Risk could not be quantified, but structure-activity analysis indicates a low to moderate hazard concern.

Inhalation Exposure: Margin of exposure calculations indicate very low concern for petroleum distillate hydrocarbons. Risk could not be quantified but is expected to be low due to low exposure and low to moderate toxicity.

Flammability: Moderate risk

Environmental: No measured risk

Regulatory Concerns

None of the chemical categories present in this blanket wash contain chemicals that may trigger specific federal environmental regulation.

Blanket Wash Formulation 14

Composition:
Fatty acid derivatives
Propylene glycol ethers
Water

VOC Content: 12%; 0.97 lbs/gal
Flashpoint: 230+°F
pH: 5.0

Performance

Wipability: wet ink- 8 strokes
dry ink- 10 strokes

Blanket swell: 1 hr.- 1.5%
5 hrs.- 3.0%

The performance of Blanket Wash 14 was demonstrated at two facilities. Facility 6 based their performance evaluation on a sample size of 15 blanket washes and printed with conventional inks. This facility found that the wash cut ink well, and the performance was good. The facility noted that extra effort was required to remove the oily residue that the wash left on the blanket.

Facility 16 based their performance evaluation on a sample size of 34 blanket washes and printed with conventional inks and printed with conventional inks. This facility found that the substitute wash did not cut ink as well as the baseline wash. Black inks and heavy ink build up were especially difficult to clean. In addition, the thick consistency of the wash made it difficult to soak into the rag.

Cost

The results of the performance demonstration indicate an increased financial cost when using Blanket Wash 14 instead of the baseline product at both facilities 6 and 16. Compared to the baseline, total costs per wash increased 133 percent at facility 6 and 24 percent at facility 16. The average cleaning time increased significantly at facility 6 compared to the baseline, requiring an additional minute per wash. Despite a decrease in the average cleaning time, overall costs per wash at facility 16 increase, driven primarily by the product's higher price. Blanket Wash 14 is priced at $9.55/gallon compared to $5.88/gallon for the baseline.

Facility #	Cost/Wash	Cost/Press	Annual Cost*	Baseline Cost*	% Change**
6	$1.07	$4.28	$10,700	$4,600	+133
16	$0.82	$3.28	$8,200	$6,600	+24

* These costs refer to the cost/press/shift/year
** Refers to the percent increase or decrease in cost that this facility would incur if it switched from using VM&P naphtha to using Blanket Wash 14. A "+" indicates an increase in cost, and a "-" indicates a decrease.

Risk and Exposure

Dermal Exposure: Risks for this formulation could not be quantified but are expected to be low based on structure-activity predictions of low toxicity for both the fatty acid derivatives and the propylene glycol ethers. Also, the fatty acid derivatives are expected to be poorly absorbed.

Inhalation Exposure: Due to negligible exposure, the fatty acid derivatives used in this formulation present no concern. Risks for the propylene glycol ether are also expected to be low due to low exposure and its predicted low toxicity.

Flammability: Low risk

Environmental: No measured risk

Regulatory Concerns

None of the chemical categories present in this blanket wash contain chemicals that may trigger specific federal environmental regulation.

Blanket Wash Formulation 16

Composition:
Terpenes

VOC Content: 99%; 7.2 lbs/gal
Flashpoint: 145°F
pH: 9.8

Performance

Wipability: wet ink- 2 strokes
dry ink- 2 strokes

Blanket swell: 1 hr.- 4.5%
5 hrs.- 10.6%

The performance of Blanket Wash 16 was not demonstrated at any facilities.

Cost

Cost estimates associated with using Blanket Wash 16 were not developed.

Risk and Exposure

Dermal Exposure: Margin of exposure calculations indicate concern for exposure to terpenes. However, the hazard value is based upon an oral study. Risks for the other chemicals in this formulation could not be quantified due to the unavailability of hazard values. Structure-activity analyses of these compounds indicate low to moderate hazard concerns.

Inhalation Exposure: Margin of exposure calculations indicate very low concern for exposure to terpenes. However, the hazard value for terpenes is based upon an oral study. Risks for the other chemicals in this formulation could not be quantified but are expected to be low due to low exposures and low to moderate toxicity.

Flammability: Moderate risk

Environmental: No measured risk

Regulatory Concerns

None of the chemical categories present in this blanket wash contain chemicals that may trigger specific federal environmental regulation.

Blanket Wash Formulation 17

Composition:
Ethoxylated nonylphenol
Glycols
Fatty acid derivatives
Alkali/salts
Water

VOC Content: 0.6%; 0.051 lbs/gal
Flashpoint: 220+°F
pH: 9.8

Performance

Wipability: wet ink- 100 strokes
dry ink- 100 strokes

Blanket swell: 1 hr.- 1.5%
5 hrs.- 1.5%

The performance of Blanket Wash 17 was not demonstrated at any facilities.

Cost

Cost estimates associated with using Blanket Wash 17 were not developed.

Risk and Exposure

Dermal Exposure: Hazard quotient calculations indicate very low concern for propylene glycol ethers. However, the hazard value is based upon an oral study. Margin of exposure calculations indicate very low concern for ethoxylated nonylphenols and alkali/salts. However, the hazard value for alkali/salts is based upon oral values. The alkanolamine component of the fatty acid derivative/alkanolamine salt presents a possible concern. However, dermal absorption of the alkanolamine salt is likely to be lower than that of free alkanolamine.

Inhalation Exposure: Hazard quotient calculations indicate no concern for glycols. However, the hazard value is based upon an oral study. Due to negligible inhalation exposure, ethoxylated nonylphenol, fatty acid derivatives and alkali/salts present very low concern.

Flammability: Low risk

Environmental: Aquatic species risk due to the presence of ethoxylated nonylphenols.

Regulatory Concerns

The following table indicates which chemical categories present in this blanket wash contain chemicals that may trigger specific federal environmental regulation.

Chemical	CWA	CAA	CERCLA	SARA 313	RCRA	OSHA
Alkali/salts	X		X			

Blanket Wash Formulation 18

Composition:
Fatty acid derivatives
Hydrocarbons, petroleum distillates
Hydrocarbons, aromatic
Dibasic esters
Esters/lactones
Alkyl benzene sulfonates

VOC Content: 60%; 4.4 lbs/gal
Flashpoint: 150°F
pH: 5.5

Performance

Wipability:	wet ink- 8 strokes	Blanket swell:	1 hr.- 1.5%
	dry ink- 7 strokes		5 hrs.- 4.5%

The performance of Blanket Wash 18 was not demonstrated at any facilities.

Cost

Cost estimates associated with using Blanket Wash 18 were not developed.

Risk and Exposure

Dermal Exposure: Margin of exposure calculations indicate concern for petroleum distillate hydrocarbons and dibasic esters. However, the hazard values are based on inhalation studies. Risk from the alkyl benzene sulfonates could not be quantified but is expected to be low based on structure-activity predictions of poor absorption and low to moderate toxicity. Risk from esters/lactones is also expected to be low based on structure-activity predictions of low toxicity.

Inhalation Exposure: Margin of exposure calculations indicate very low concern for petroleum distillate hydrocarbons and dibasic esters. Risks for other chemicals in this formulation could not be quantified but are expected to be low due to low or negligible exposures and low to moderate hazard concerns.

Flammability: Not available

Environmental: No measured risk

Regulatory Concerns

The following table indicates which chemical categories present in this blanket wash contain chemicals that may trigger specific federal environmental regulation.

Chemical	CWA	CAA	CERCLA	SARA 313	RCRA	OSHA
Hydrocarbons, aromatic	X	X	X	X	X	X
Alkyl benzene sulfonates	X		X			

Blanket Wash Formulation 19

Composition:
Fatty acid derivatives
Propylene glycol ethers
Water

VOC Content: 22%; 1.8 lbs/gal
Flashpoint: 230+°F
pH: 4.6

Performance

Wipability: wet ink- 11 strokes
dry ink- 9 strokes

Blanket swell: 1 hr.- 1.5%
5 hrs.- 1.5%

The performance of Blanket Wash 19 was demonstrated at two facilities. Facility 18 based their performance evaluation on a sample size of 5 blanket washes and printed with soy oil-based inks. This facility noted that the thick consistency of the wash made it difficult to soak into the rag, which resulted in uneven application. Large quantities were required to cut ink.

Facility 19 based their performance evaluation on a sample size of 8 blanket washes and printed with soy oil-based inks. This facility noted that the thick consistency of the wash was messy and difficult to use. The demonstration was cut short due to the extra effort and time required to clean the blanket.

Cost

The results of the performance data indicate an increased financial cost when using Blanket Wash 19 instead of the baseline at both facilities 18 and 19. Overall costs per wash increased roughly 170 percent and 70 percent at facilities 18 and 19, respectively. This increase in cost was due in large part to an increase in cleaning and drying times. Press operators commented that cleaning and drying times were excessive, as reflected in the performance data; performance results indicate a 150 percent increase and a 60 percent increase in cleaning times at facilities 18 and 19, respectively.

Facility #	Cost/Wash	Cost/Press	Annual Cost*	Baseline Cost*	% Change**
18	$1.66	$6.64	$16,600	$6,200	+168
19	$0.89	$3.56	$8,900	$5,300	+68

* These costs refer to the cost/press/shift/year
** Refers to the percent increase or decrease in cost that this facility would incur if it switched from using VM&P naphtha to using Blanket Wash 19. A "+" indicates an increase in cost, and a "-" indicates a decrease.

Risk and Exposure

Dermal Exposure: Risks for this formulation could not be calculated due to the unavailability of hazard values. However, risks are expected to be low based on structure-activity predictions of low toxicity of propylene glycol ethers and poor absorption and low to moderate toxicity of the fatty acid derivatives.

Inhalation Exposure: Due to negligible exposure, the fatty acid derivatives present no concern. Risks for propylene glycol ethers are expected to be low due to low exposure and low hazard concern.

Flammability: Low risk

Environmental: No measured risk

Regulatory Concerns

None of the chemical categories present in this blanket wash contain chemicals that may trigger specific federal environmental regulation.

Blanket Wash Formulation 20

Composition:
Water
Hydrocarbons, petroleum distillates
Hydrocarbons, aromatic
Alkyl benzene sulfonates

VOC Content: 35%; 2.7 lbs/gal
Flashpoint: 170°F
pH: 7.1

Performance

Wipability: wet ink- 5 strokes
dry ink- 7 strokes

Blanket swell: 1 hr.- 0.0%
5 hrs.- 1.5%

The performance of Blanket Wash 20 was demonstrated at two facilities. Facility 11 based their performance evaluation on a sample size of 17 blanket washes and printed with conventional and vegetable-based inks. This facility considered the performance of the wash to be fair, but worse than facility and baseline washes. The wash left an oily residue on the blanket that required additional rotations to remove. The wash also was hard to apply to rags due to its thick consistency.

Facility 12 based their performance evaluation on a sample size of one blanket wash and printed with conventional inks. The product induced nausea in press operators, and the facility discontinued the test.

Cost

The results of the performance demonstration indicate an increased financial cost when using Blanket Wash 20 instead of the baseline. Average costs per wash increased roughly 60 percent and 95 percent at facilities 11 and 12, respectively. For facility 11, this increase is due in large part to an increase in cleaning times. Cleaning times at facility 11 increased from an average of 60 seconds for the baseline to an average of 100 seconds for Blanket Wash 20. The contribution of labor to the product cost for Facility 12 is based on only one observation.

Facility #	Cost/Wash	Cost/Press	Annual Cost*	Baseline Cost*	% Change**
11	$1.13	$4.52	$11,300	$7,000	+61
12	$1.58	$6.32	$15,800	$8,100	+95

* These costs refer to the cost/press/shift/year
** Refers to the percent increase or decrease in cost that this facility would incur if it switched from using VM&P naphtha to using Blanket Wash 20. A "+" indicates an increase in cost, and a "-" indicates a decrease.

Risk and Exposure

Dermal Exposure: Margin of exposure calculations indicate concern for petroleum distillate hydrocarbons. However, the hazard value is based upon an inhalation study. Risks for the other chemicals in this formulation could not be quantified due to the unavailability of hazard value. Risk from the alkyl benzene sulfonates is expected to be low based on structure-activity predictions of poor absorption and low to moderate toxicity. Structure-activity analysis

indicates a moderate hazard concern for aromatic hydrocarbons due to the possible presence of carcinogenic compounds.

Inhalation Exposure: Margin of exposure calculations indicate very low concern for petroleum distillate hydrocarbons. Risks for other chemicals in this formulation could not be quantified but are expected to be low due to low or negligible exposures and low to moderate hazard concerns.

Flammability: Low risk

Environmental: Aquatic species risk is due to the presence of alkyl benzene sulfonates.

Regulatory Concerns

The following table indicates which chemical categories present in this blanket wash contain chemicals that may trigger specific federal environmental regulation.

Chemical	CWA	CAA	CERCLA	SARA 313	RCRA	OSHA
Hydrocarbons, aromatic	X	X	X	X	X	X
Alkyl benzene sulfonates	X		X			

Blanket Wash Formulation 21

Composition:
Hydrocarbons, aromatic
Hydrocarbons, petroleum distillates
Fatty acid derivatives

VOC Content: 47%; 3.5 lbs/gal
Flashpoint: 115°F
pH: 6.2

Performance

Wipability: wet ink- 7 strokes
dry ink- 6 strokes

Blanket swell: 1 hr.- 0.0%
5 hrs.- 1.5%

The performance of Blanket Wash 21 was demonstrated at two facilities. Facility 6 based their performance evaluation on a sample size of 6 blanket washes and printed with conventional inks. This facility considered the performance of the wash to be fair. The wash cut ink well, but the oily residue was difficult to remove and began to affect subsequent runs. Extra waste sheets were required to get back up to color due to the residue.

Facility 17 based their performance evaluation on a sample size of 25 blanket washes and printed with conventional inks. This facility also considered the performance of the wash to be fair. This facility also found that the wash cut the ink well. The oily residue caused print problems if it was not completely removed. In addition, the wash did not absorb into the rag easily.

Cost

The results of the performance demonstration indicate an increased financial cost when using Blanket Wash 21 instead of the baseline. Costs per wash increase roughly 120 percent at facility 6 and 40 percent at facility 17 when compared to the baseline. Extra wiping was required to clear the blanket as reflected in the performance data --- when compared to the baseline, average cleaning times increased roughly 110 percent for facility 6 and 50 percent for facility 17.

Facility #	Cost/Wash	Cost/Press	Annual Cost*	Baseline Cost*	% Change**
6	$1.01	$4.04	$10,100	$4,600	+120
17	$0.58	$2.32	$5,800	$4,100	+41

* These costs refer to the cost/press/shift/year
** Refers to the percent increase or decrease in cost that this facility would incur if it switched from using VM&P naphtha to using Blanket Wash 21. A "+" indicates an increase in cost, and a "-" indicates a decrease.

Risk and Exposure

Dermal Exposure: Margin of exposure calculations indicate concern for aromatic hydrocarbons and petroleum distillate hydrocarbons. However, the hazard values are based upon inhalation studies. Risk for the fatty acid derivatives could not be quantified but are expected to be low based on structure-activity predictions of poor absorption and low toxicity.

Inhalation Exposure: Margin of exposure calculations indicate very low concern for aromatic hydrocarbons and petroleum distillate hydrocarbons. Due to negligible exposure and predicted low toxicity and absorption, fatty acid derivatives present no concern.

Flammability: Moderate risk

Environmental: No measured risk

Regulatory Concerns

The following table indicates which chemical categories present in this blanket wash contain chemicals that may trigger specific federal environmental regulation.

Chemical	CWA	CAA	CERCLA	SARA 313	RCRA	OSHA
Hydrocarbons, aromatic	X	X	X	X	X	X

Blanket Wash Formulation 22

Composition:
Fatty acids derivatives
Hydrocarbons,aromatic
Water

VOC Content: Not measured
Flashpoint: 157°F (full strength)
pH: 7.4 (25%)

Performance

Wipability: wet ink- 13 strokes
dry ink- 13 strokes

Blanket swell: 1 hr.- 1.5%
5 hrs.- 1.5%

The performance of Blanket Wash 22 was demonstrated at two facilities. Facility 12 based their performance evaluation on a sample size of 5 blanket washes and printed with conventional inks. This facility considered the wash to be a fair performer overall. The substitute wash cut ink as well as the baseline, but it did not readily soak into the rag, creating delays.

Facility 13 based their performance evaluation on a sample size of 17 blanket washes and printed with conventional inks. This facility also considered the wash to be a fair performer. The facility found that the wash was difficult to apply to the rag due to its thick consistency. In addition, the wash left the blanket slightly streaked and wet. As a result, extra drying time was required to prevent quality problems. The facility also found that the wash cut ink as well as baseline wash, but it required greater effort.

Cost

Performance data indicate mixed results for Blanket Wash 22. Total costs per wash increased 89 percent for facility 13, but increased only 1 percent for facility 12. Despite a 34 percent decrease in the average quantity used, costs associated with product use (i.e., volume x price) increased 50 percent for facility 12. Blanket Wash 22 is priced at $13.15/gallon compared to a price of $5.88/gallon for the baseline product. Average cleaning time increased 67 percent at facility 13 compared to the baseline.

Facility #	Cost/Wash	Cost/Press	Annual Cost*	Baseline Cost*	% Change**
12	$0.82	$3.28	$8,200	$8,100	+1
13	$1.51	$6.04	$15,100	$8,000	+89

* These costs refer to the cost/press/shift/year
** Refers to the percent increase or decrease in cost that this facility would incur if it switched from using VM&P naphtha to using Blanket Wash 22. A "+" indicates an increase in cost, and a "-" indicates a decrease.

Risk and Exposure

Dermal Exposure: Risks for this formulation could not be calculated due to the unavailability of hazard values. Structure-activity analysis indicates a moderate hazard concern for aromatic hydrocarbons due to the possible presence of carcinogenic compounds.

Risks from the fatty acid derivatives are expected to be low based on structure-activity predictions of poor absorption and low to moderate toxicity.

Inhalation Exposure: Risks could not be quantified but are expected to be low due to low or negligible exposures.

Flammability: Low risk

Environmental: No measured risk

Regulatory Concerns

The following table indicates which chemical categories present in this blanket wash contain chemicals that may trigger specific federal environmental regulation.

Chemical	CWA	CAA	CERCLA	SARA 313	RCRA	OSHA
Hydrocarbons, aromatic	X	X	X	X	X	X

Blanket Wash Formulation 23

Composition:
Terpenes
Nitrogen heterocyclics
Alkoxylated alcohols
Water

VOC Content: 6%; 0.48 lbs/gal
Flashpoint: 140°F
pH: 9.2

Performance

Wipability:	wet ink- 24 strokes	Blanket swell: 1 hr.- 0.0%
	dry ink- 100 strokes	5 hrs.- 1.5%

The performance of Blanket Wash 23 was not demonstrated at any facilities.

Cost

Cost estimates associated with using Blanket Wash 23 were not developed.

Risk and Exposure

Dermal Exposure: Margin of exposure calculations indicate possible concerns for terpenes and nitrogen heterocyclics. However, the hazard value for terpenes is based upon an oral study. Risks for the alkoxylated alcohols could not be quantified but are expected to be low based on structure-activity predictions of poor absorption and low to moderate toxicity.

Inhalation Exposure: Margin of exposure calculations indicate very low concern for terpenes and nitrogen heterocyclics. However, the hazard value for terpenes is based upon an oral study. Risks for the alkoxylated alcohols could not be quantified but are expected to be low based on low exposure and structure-activity predictions of poor absorption and low to moderate toxicity.

Flammability: Moderate risk

Environmental: No measured risk

Regulatory Concerns

None of the chemical categories present in this blanket wash contain chemicals that may trigger specific federal environmental regulation.

Blanket Wash Formulation 24

Composition:
Terpenes
Ethylene glycol ethers
Ethoxylated nonylphenol
Alkyl benzene sulfonates
Alkali/salts
Water

VOC Content: 19%; 1.5 lbs/gal
Flashpoint: 100°F
pH: 9.9

Performance

Wipability: wet ink- 15 strokes
dry ink- 12 strokes

Blanket swell: 1 hr.- 1.5%
5 hrs.- 3.0%

The performance of Blanket Wash 24 was demonstrated at two facilities. Facility 16 based their performance evaluation on a sample size of 28 blanket washes and printed with conventional inks. This facility found that the wash cut ink well. However, the wash left an oily residue, which required some extra effort to wipe off. In addition, the oily residue significantly increased the number of copies required to return to print quality.

Facility 17 based their performance evaluation on a sample size of four blanket washes and printed with conventional inks. This facility also found that the wash cut ink well. Again, extra effort was required to wipe off the oily residue. In addition, the thick consistency of the wash caused the operator to curtail use. The operator felt that the citrus odor of the wash was very strong.

Cost

The results of the performance demonstration indicate an increased financial cost when using Blanket Wash 24 instead of the baseline. Costs per wash increased roughly 50 percent at facility 16 and 110 percent at facility 17, when compared to the baseline. When compared to the baseline, average cleaning times increased 18 percent and 160 percent for facilities 16 and 17, respectively. Despite the fact that facility 17 used a smaller average quantity of Blanket Wash 24 compared to the baseline, the costs associated with blanket wash use (i.e., volume x price) increased due to a much higher price per gallon. The manufacturers price for product 24 is $17.85/gallon versus $5.88/gallon for the baseline product. Costs associated with product use (i.e., volume x price) increased roughly 220 percent and 160 percent for facilities 16 and 17, respectively.

Facility #	Cost/Wash	Cost/Press	Annual Cost*	Baseline Cost*	% Change**
16	$0.97	$3.88	$9,700	$6,600	+47
17	$0.88	$3.52	$8,800	$4,100	+115

* These costs refer to the cost/press/shift/year
** Refers to the percent increase or decrease in cost that this facility would incur if it switched from using VM&P naphtha to using Blanket Wash 24. A "+" indicates an increase in cost, and a "-" indicates a decrease.

Risk and Exposure

Dermal Exposure: Margin of exposure calculations indicate concern for alkyl benzene sulfonates and terpenes, possible concern for ethylene glycol ethers, and very low concern for ethoxylated nonylphenol. However, the hazard value for terpenes is based upon an oral study. Risks for alkali/salts could not be quantified but are expected to be very low based on structure-activity predictions of no absorption and low to moderate toxicity.

Inhalation Exposure: Margin of exposure calculations indicate very low concern for terpenes and ethylene glycol ethers. However, the hazard value for terpenes is based upon an oral study. Due to negligible exposure, the other chemicals in this formulation present no concern.

Flammability: Moderate risk

Environmental: Aquatic species risk due to the presence of ethoxylated nonylphenols.

Regulatory Concerns

The following table indicates which chemical categories present in this blanket wash contain chemicals that may trigger specific federal environmental regulation.

Chemical	CWA	CAA	CERCLA	SARA 313	RCRA	OSHA
Ethylene glycol ethers		X		X		
Alkali/salts	X		X			
Alkyl benzene sulfonates	X		X			

Blanket Wash Formulation 25

Composition:
Terpenes
Esters/lactones

VOC Content: 55%; 4.1 lbs/gal
Flashpoint: 220+°F
pH: 4.3

Performance

Wipability:	wet ink- 22 strokes	Blanket swell: 1 hr.- 3.0%
	dry ink- 32 strokes	5 hrs.- 4.5%

The performance of Blanket Wash 25 was not demonstrated at any facilities.

Cost

Cost estimates associated with using Blanket Wash 25 were not developed.

Risk and Exposure

Dermal Exposure: Margin of exposure calculations indicate concern for exposure to terpenes and possible concern for exposure to esters/lactones. However, the hazard values are based upon oral studies. Risks for other chemicals in this formulation could not be quantified due to the unavailability of hazard values. The other chemicals are all terpene-type compounds and are rated as low to moderate hazard concern based on structure-activity analysis.

Inhalation Exposure: Margin of exposure calculations indicate very low concern for exposure to terpenes and esters/lactones. However, the hazard values are based upon oral studies. Risks for other chemicals in this formulation could not be quantified but are expected to be low based on low exposure and structure-activity predictions of low to moderate toxicity.

Flammability: Low risk

Environmental: No measured risk

Regulatory Concerns

None of the chemical categories present in this blanket wash contain chemicals that may trigger specific federal environmental regulation.

Blanket Wash Formulation 26

Composition:
Fatty acids derivatives
Esters/lactones

VOC Content: 18%; 1.3 lbs/gal
Flashpoint: 230+°F
pH: 7.8 (fluctuates wildly)

Performance

Wipability: wet ink- 6 strokes
dry ink- 14 strokes

Blanket swell: 1 hr.- 0.0%
5 hrs.- 0.0%

The performance of Blanket Wash 26 was demonstrated at two facilities. Facility 5 based their performance evaluation on a sample size of 14 blanket washes and printed with conventional inks. This facility considered the performance to be good after every wash. The wash performed as well as both the standard facility wash and the baseline wash. However, a slight oily residue caused print quality problems when the wash was used for roller clean-up.

Facility 15 based their performance evaluation on a sample size of 22 blanket washes and printed with conventional inks. This facility also considered the performance to be good after every wash. Again, the wash performed as well as both the standard facility wash and the baseline wash.

Cost

Performance data indicate mixed results for Blanket Wash 26. Total costs per wash increased roughly 30 percent for facility 5, but decreased 6 percent at facility 15. Despite the fact that Blanket Wash 26 is priced higher than the baseline wash, differences in costs associated with product use (i.e., volume x price) did not contribute to the higher overall cost per wash at facility 5. Blanket Wash 26 is priced at $12.24/gallon compared to a price of $5.88/gallon for the baseline. Performance data indicate that the average quantity of blanket wash used at both facilities decreased by roughly 40 percent compared to the baseline. The savings experienced by facility 26 result from a 14 percent decrease in cleaning time compared to the baseline.

Facility #	Cost/Wash	Cost/Press	Annual Cost*	Baseline Cost*	% Change**
5	$0.73	$2.92	$7,300	$5,500	+33
15	$0.47	$1.88	$4,700	$5,000	-6

* These costs refer to the cost/press/shift/year
** Refers to the percent increase or decrease in cost that this facility would incur if it switched from using VM&P naphtha to using Blanket Wash 26. A "+" indicates an increase in cost, and a "-" indicates a decrease.

Risk and Exposure

Dermal Exposure: Margin of exposure calculations indicate concern for esters/lactones and very low concern for the fatty acid derivatives. However, the hazard values are based upon oral studies. Risks for the fatty acid derivatives could not be quantified but are expected to be low based on structure-activity predictions of poor absorption and low toxicity.

Inhalation Exposure: Due to negligible exposure, the chemicals used in this formulation present no concern.

Flammability: Low risk

Environmental: No measured risk

Regulatory Concerns

None of the chemical categories present in this blanket wash contain chemicals that may trigger specific federal environmental regulation.

Blanket Wash Formulation 27

Composition:
Terpenes

VOC Content: 93%; 7.2 lbs/gal
Flashpoint: 145°F
pH: 3.9

Performance

Wipability:	wet ink- 3 strokes	Blanket swell: 1 hr.- 3.0%
	dry ink- 3 strokes	5 hrs.- 4.5%

The performance of Blanket Wash 27 was not demonstrated at any facilities.

Cost

Cost estimates associated with using Blanket Wash 27 were not developed.

Risk and Exposure

Dermal Exposure: Margin of exposure calculations indicate concern for terpenes. However, the hazard value is based upon an oral study. Risks for the other chemicals in this formulation could not be quantified due to the unavailability of hazard values. The other chemicals are all terpene-type compounds and are rated as low to moderate hazard concern based on structure-activity analysis.

Inhalation Exposure: Margin of exposure calculations indicate very low concern for terpenes. However, the hazard value is based upon an oral study. Risks for the other chemicals in this formulation could not be quantified but are expected to be low based on low exposure and structure-activity predictions of low to moderate toxicity.

Flammability: Moderate risk

Environmental: No measured risk

Regulatory Concerns

None of the chemical categories present in this blanket wash contain chemicals that may trigger specific federal environmental regulation.

Blanket Wash Formulation 28

Composition:
Hydrocarbons, petroleum distillates

VOC Content: 100%; 6.2 lbs/gal
Flashpoint: 50°F
pH: 6.6

Performance

Wipability:	wet ink- 3 strokes	Blanket swell:	1 hr.- 1.5%
	dry ink- 8 strokes		5 hrs.- 3.0%

The performance of Blanket Wash 28 was not demonstrated at any facilities.

Cost

Cost estimates associated with using Blanket Wash 28 were not developed.

Risk and Exposure

Risks for this formulation could not be quantified due to the unavailability of hazard values. Structure-activity analysis indicates a low to moderate concern for petroleum distillate hydrocarbons.

Flammability: Not available

Environmental: Not available

Regulatory Concerns

None of the chemical categories present in this blanket wash contain chemicals that may trigger specific federal environmental regulation.

Blanket Wash Formulation 29

Composition:
Fatty acid derivatives

VOC Content: 30%; 2.1 lbs/gal
Flashpoint: 230+°F
pH: 7.2

Performance

Wipability: wet ink- 9 strokes
dry ink- 18 strokes

Blanket swell: 1 hr.- 1.5%
5 hrs.- 1.5%

The performance of Blanket Wash 29 was demonstrated at two facilities. Facility 7 based their performance evaluation on a sample size of three blanket washes and printed with conventional inks. This facility considered the performance of the wash to be good. The wash cut ink well; however, extra effort was required to dry the blanket.

Facility 8 based their performance evaluation on a sample size of 36 blanket washes and printed with conventional inks. This facility noted that the wash did not cut ink as well as the baseline wash and did not cut paper dust or powder. In addition, a slightly oily film remained on the blanket, which required more effort to remove.

Cost

Using Blanket Wash 29 rather than the baseline, costs per press increased roughly 60 percent at both facilities 7 and 8. Blanket Wash 29 is priced three-times higher than the baseline, contributing significantly to the higher overall costs associated with its use. Costs associated with product use (i.e., volume x price) increase 300 percent and 230 percent at facilities 7 and 8 respectively due primarily to the products higher price. Blanket Wash 29 is priced at $18.00/gallon compared to a price of $5.88/gallon for the baseline. In addition, average cleaning times are higher for Blanket Wash 29 compared to the baseline for both facilities. Cleaning times increased 22 percent for facility 7 and 64 percent for facility 8.

Facility #	Cost/Wash	Cost/Press	Annual Cost*	Baseline Cost*	% Change**
7	$0.93	$3.72	$9,300	$5,700	+63
8	$0.89	$3.56	$8,900	$5,500	+62

* These costs refer to the cost/press/shift/year
** Refers to the percent increase or decrease in cost that this facility would incur if it switched from using VM&P naphtha to using Blanket Wash 29. A "+" indicates an increase in cost, and a "-" indicates a decrease.

Risk and Exposure

Dermal Exposure: Risks for this formulation could not be quantified but are expected to be low based on structure-activity predictions of poor absorption and low toxicity for the fatty acid derivatives.

Inhalation Exposure: Due to negligible exposure, the chemicals in this formulation present no concern.

Flammability: Low risk

Environmental: No measured risk

Regulatory Concerns

None of the chemical categories present in this blanket wash contain chemicals that may trigger specific federal environmental regulation.

Blanket Wash Formulation 30

Composition:
Hydrocarbons, aromatic
Propylene glycol ethers
Water

VOC Content: 7%; 0.48 lbs/gal
Flashpoint: 100°F (full strength)
pH: 7.6 (25%)

Performance

Wipability: wet ink- 5 strokes
dry ink- 11 strokes

Blanket swell: 1 hr.- 0.7%
5 hrs.- 1.5%

The performance of Blanket Wash 30 was demonstrated at two facilities. Facility 18 based their performance evaluation on a sample size of three blanket washes and printed with soy oil-based inks. This facility considered the performance of the wash to be good. This facility noted that the wash cut ink well and worked best when not diluted with water.

Facility 19 based their performance evaluation on a sample size of eight blanket washes and printed with soy oil-based inks. This facility also noted that the wash cut ink well. However, the wash left an oily film on the blanket, which required extra effort to dry. In addition, the thick consistency of the wash was difficult to use, and extra effort was required due to its resistance to the surface of the blanket.

Cost

The results of the performance demonstration indicate an increased financial cost when using Blanket Wash 30 instead of the baseline. Compared to the baseline, costs per wash increased roughly 60 percent at facility 18 and 20 percent at facility 19. Increased cleaning time was the primary contributor to the higher cost per wash for both facilities. According to the performance data, cleaning times at facility 18 increased from an average of 48 seconds for the baseline to an average of 82 seconds for Blanket Wash 30; however, this alternative was only tested under heavy ink coverage conditions and the baseline wash was observed under light and medium coverage conditions. The press operator at facility 19 commented that Blanket Wash 30 evaporated slowly; cleaning times for the alternative increased by roughly 30 percent, compared to the baseline.

Facility #	Cost/Wash	Cost/Press	Annual Cost*	Baseline Cost*	% Change**
18	$1.01	$4.04	$10,100	$6,200	+63
19	$0.62	$2.48	$6,200	$5,300	+17

* These costs refer to the cost/press/shift/year
** Refers to the percent increase or decrease in cost that this facility would incur if it switched from using VM&P naphtha to using Blanket Wash 30. A "+" indicates an increase in cost, and a "-" indicates a decrease.

Risk and Exposure

Dermal Exposure: Margin of exposure calculations indicate concern for aromatic hydrocarbons. However, the hazard value is based upon an inhalation study. Risks for propylene glycol ethers could not be quantified due to the unavailability of hazard values. Structure-activity analysis indicates low hazard concern for propylene glycol ethers.

Inhalation Exposure: Margin of exposure calculations indicate very low concern for aromatic hydrocarbons. Risks for propylene glycol ethers could not be quantified but are expected to be low based on low exposure and structure-activity predictions of low toxicity.

Flammability: Moderate risk

Environmental: No measured risk

Regulatory Concerns

The following table indicates which chemical categories present in this blanket wash contain chemicals that may trigger specific federal environmental regulation.

Chemical	CWA	CAA	CERCLA	SARA 313	RCRA	OSHA
Hydrocarbons, aromatic	X	X	X	X	X	X

Blanket Wash Formulation 31

Composition:
Hydrocarbons, aromatic
Hydrocarbons, petroleum distillates

VOC Content: 99%; 6.6 lbs/gal
Flashpoint: 105°F
pH: 7.6

Performance

Wipability: wet ink- 3 strokes
dry ink- 3 strokes

Blanket swell: 1 hr.- 1.5%
5 hrs.- 3.0%

The performance of Blanket Wash 31 was demonstrated at two facilities. Facility 7 based their performance evaluation on a sample size of four blanket washes and printed with conventional inks. This facility found that the wash cut ink well. However, the wash left an oily residue on the blanket, which required slightly more effort to remove. In addition, the oily residue slightly increased the number of copies required to return to print quality. The facility noted that the smell was not as strong as the facility's standard wash or the baseline wash.

Facility 8 based their performance evaluation on a sample size of 61 blanket washes and printed with conventional inks. This facility also found that the wash cut ink well. The wash performed as well as the standard wash, and the facility considered the performance to be good. Slightly more effort was required due to the resistance of the wash to the surface of the blanket.

Cost

The results of the performance demonstration indicate an increased financial cost when using Blanket Wash 31 instead of the baseline. Compared to the baseline, costs per wash increased roughly 180 percent at facility 7 and 7 percent at facility 8. The press operator at facility 7 observed that drying times for Blanket Wash 31 were greater than the baseline; cleaning times averaged 140 seconds for Blanket Wash 31, compared to 45 seconds for the baseline product. The press operator at facility 8 experienced a decrease in cleaning time, but an increase in the quantity of blanket wash used. According to the performance data, cleaning times at facility 8 decreased by 4 percent compared to the baseline. The average quantity of blanket wash used, however, increases roughly 60 percent, off-setting the gains in labor savings.

Facility #	Cost/Wash	Cost/Press	Annual Cost*	Baseline Cost*	% Change**
7	$1.59	$6.36	$15,900	$5,700	+179
8	$0.59	$2.36	$5,900	$5,500	+7

* These costs refer to the cost/press/shift/year
** Refers to the percent increase or decrease in cost that this facility would incur if it switched from using VM&P naphtha to using Blanket Wash 31. A "+" indicates an increase in cost, and a "-" indicates a decrease.

Risk and Exposure

Dermal Exposure: Margin of exposure calculations indicate concern for exposure to aromatic hydrocarbons. However, the hazard value is based upon an inhalation study. Risks for petroleum distillate hydrocarbons could not be quantified due to the unavailability of hazard values. Structure-activity analysis indicates low to moderate hazard concern for petroleum distillate hydrocarbons.

Inhalation Exposure: Margin of exposure calculations indicate very low concern for exposure to aromatic hydrocarbons. Risks for petroleum distillate hydrocarbons could not be quantified but are expected to be low based on low exposure and structure-activity predictions of low to moderate toxicity.

Flammability: Moderate risk

Environmental: No measured risk

Regulatory Concerns

The following table indicates which chemical categories present in this blanket wash contain chemicals that may trigger specific federal environmental regulation.

Chemical	CWA	CAA	CERCLA	SARA 313	RCRA	OSHA
Hydrocarbons, aromatic	X	X	X	X	X	X

Blanket Wash Formulation 32

Composition:
Hydrocarbons, petroleum distillates

VOC Content: 99%; 6.5 lbs/gal
Flashpoint: 220°F
pH: 8.5

Performance

Wipability: wet ink- 5 strokes
dry ink- 30 strokes

Blanket swell: 1 hr.- 0.1%
5 hrs.- 1.5%

The performance of Blanket Wash 32 was demonstrated at two facilities. Facility 1 based their performance evaluation on a sample size of four blanket washes and printed with vegetable-based inks. This facility considered the performance of the wash to be good. However, the substitute wash required slightly higher effort to remove excess wash than the standard wash. The substitute wash left an oily-residue on the blanket affecting subsequent print quality.

Facility 5 based their performance evaluation on a sample size of 12 blanket washes and printed with conventional inks. This facility also considered the performance of the wash to be good. The substitute wash left a slight, oily residue that was removed with dry rags; the residue did not affect print quality.

Cost

Performance data indicate mixed results in the performance of Blanket Wash 32. Total costs per wash increased roughly 120 percent at facility 1, but decreased 20 percent at facility 5. Material costs (i.e., press wipes) contributed significantly to the higher costs per wash observed at facility 1. Costs associated with material use increased roughly 160 percent compared to the baseline. Facility 5 reported lower cleaning times and reduced blanket wash use for Blanket Wash 32, compared to the baseline. Performance results indicate a 15 percent decrease in cleaning time and a 60 percent decrease in the quantity of blanket wash used for facility 5.

Facility #	Cost/Wash	Cost/Press	Annual Cost*	Baseline Cost*	% Change**
1	$1.31	$5.24	$13,100	$5,900	+122
5	$0.43	$1.72	$4,300	$5,300	-19

* These costs refer to the cost/press/shift/year
** Refers to the percent increase or decrease in cost that this facility would incur if it switched from using VM&P naphtha to using Blanket Wash 32. A "+" indicates an increase in cost, and a "-" indicates a decrease.

Risk and Exposure

Risks for this formulation could not be quantified due to the unavailability of hazard values. Structure-activity analysis indicates low to moderate hazard concern for petroleum distillate hydrocarbons.

Flammability: Low risk

Environmental: No measured risk

Regulatory Concerns

None of the chemical categories present in this blanket wash contain chemicals that may trigger specific federal environmental regulation.

Blanket Wash Formulation 33

Composition:
Hydrocarbons, petroleum distillates
Hydrocarbons, aromatic
Propylene glycol ethers
Water

VOC Content: 46%; 3.4 lbs/gal
Flashpoint: 105°F
pH: 7.2 (fluctuates wildly)

Performance

Wipability: wet ink- 4 strokes
dry ink- 4 strokes

Blanket swell: 1 hr.- 4.5%
5 hrs.- 7.6%

The performance of Blanket Wash 33 was not demonstrated at any facilities.

Cost

Cost estimates associated with using Blanket Wash 33 were not developed.

Risk and Exposure

Dermal Exposure: Margin of exposure calculations indicate concern for petroleum distillate hydrocarbons and aromatic hydrocarbons and very low concern for propylene glycol ethers. However, the hazard values for petroleum distillate hydrocarbons and aromatic hydrocarbons are based upon an inhalation study.

Inhalation Exposure: Margin of exposure calculations indicate very low concern for petroleum distillate hydrocarbons, aromatic hydrocarbons, and propylene glycol ethers.

Flammability: Not available

Environmental: Not available

Regulatory Concerns

The following table indicates which chemical categories present in this blanket wash contain chemicals that may trigger specific federal environmental regulation.

Chemical	CWA	CAA	CERCLA	SARA 313	RCRA	OSHA
Hydrocarbons, aromatic	X	X	X	X	X	X

Blanket Wash Formulation 34

Composition:
Water
Terpenes
Hydrocarbons, petroleum distillates
Alkoxylated alcohols
Fatty acid derivatives

VOC Content: 39%; 2.8 lbs/gal
Flashpoint: 138°F
pH: 6.6

Performance

Wipability: wet ink- 10 strokes
dry ink- 20 strokes

Blanket swell: 1 hr.- 1.5%
5 hrs.- 3.0%

The performance of Blanket Wash 34 was demonstrated at two facilities. Facility 1 based their performance evaluation on a sample size of 37 blanket washes and printed with vegetable-based inks. This facility considered the performance of the wash to be good. The wash cut the ink well with the same effort as with the standard wash for light/medium ink coverage. For heavy ink coverage, slightly more effort was required, but the level of effort was acceptable.

Facility 19 based their performance evaluation on a sample size of 13 blanket washes and printed with soy-oil based inks. This facility considered the performance of the wash to be fair/poor. Again, the wash cut the ink well. However, it did not soak into the rag. In addition, the wash left an oily residue, which required extra effort to remove.

Cost

The results of the performance demonstration indicate an increased financial cost when using Blanket Wash 34 instead of the baseline; average costs per wash increased roughly 50 percent and 80 percent at facilities 1 and 19, respectively. Performance data indicate that costs associated with product use (i.e., volume x price) at facility 1 increased roughly 160 percent. This increase is completely attributable to the alternative product's higher price. Blanket Wash 34 is priced at $15/gallon compared to a price of $5.88/gallon for the baseline. At facility 19, increased cleaning time is the single largest contributor to the higher average cost per wash of Blanket Wash 34; cleaning times averaged 67 seconds for Blanket Wash 31, compared to 41 seconds for the baseline product.

Facility #	Cost/Wash	Cost/Press	Annual Cost*	Baseline Cost*	% Change**
1	$0.89	$3.56	$8,900	$5,900	+51
19	$0.95	$3.80	$9,500	$5,300	+79

* These costs refer to the cost/press/shift/year
** Refers to the percent increase or decrease in cost that this facility would incur if it switched from using VM&P naphtha to using Blanket Wash 34. A "+" indicates an increase in cost, and a "-" indicates a decrease.

Risk and Exposure

Dermal Exposure: Margin of exposure calculations indicate concern for terpenes and very low concern for the fatty acid derivatives. However, the hazard values are based upon oral studies. Risks for fatty acid derivatives could not be quantified but are expected to be low based on structure-activity predictions of poor absorption and low to moderate toxicity. Risks for petroleum distillate hydrocarbons could not be quantified. Structure-activity analysis indicates low to moderate hazard concern for these chemicals.

Inhalation Exposure: Margin of exposure calculations indicate very low concern for terpenes. However, the hazard value is based upon an oral study. Due to negligible exposure, the fatty acid derivatives present no concern. Risks for petroleum distillate hydrocarbons could not be quantified but are expected to be low due to low exposure and structure-activity predictions of low to moderate hazard concern.

Flammability: Moderate risk

Environmental: No measured risk

Regulatory Concerns

None of the chemical categories present in this blanket wash contain chemicals that may trigger specific federal environmental regulation.

Blanket Wash Formulation 35

Composition:
Hydrocarbons, petroleum distillates
Hydrocarbons, aromatic

VOC Content: 99%; 6.7 lbs/gal
Flashpoint: 105°F
pH: 6.0

Performance

Wipability: wet ink- 3 strokes
dry ink- 5 strokes

Blanket swell: 1 hr.- 1.5%
5 hrs.- 6.1%

The performance of Blanket Wash 35 was not demonstrated at any facilities.

Cost

Cost estimates associated with using Blanket Wash 35 were not developed.

Risk and Exposure

Dermal Exposure: Margin of exposure calculations indicate concern for aromatic hydrocarbons. However, the hazard value is based upon an inhalation study. Risks for petroleum distillate hydrocarbons could not be quantified due to the unavailability of hazard values. Structure-activity analysis indicates low to moderate hazard concern for petroleum distillate hydrocarbons.

Inhalation Exposure: Margin of exposure calculations indicate very low concern for aromatic hydrocarbons. Risks for petroleum distillate hydrocarbons could not be quantified but are expected to be low based on low exposure and structure-activity predictions of low to moderate toxicity.

Flammability: Moderate risk

Environmental: No measured risk

Regulatory Concerns

The following table indicates which chemical categories present in this blanket wash contain chemicals that may trigger specific federal environmental regulation.

Chemical	CWA	CAA	CERCLA	SARA 313	RCRA	OSHA
Hydrocarbons, aromatic	X	X	X	X	X	X

Blanket Wash Formulation 36

Composition:
Fatty acid derivatives
Hydrocarbons, petroleum distillates
Hydrocarbons, aromatic
Propylene glycol ethers

VOC Content: 48%; 3.5 lbs/gal
Flashpoint: 175°F
pH: 5.7 (fluctuates wildly)

Performance

Wipability: wet ink- 4 strokes
dry ink- 5 strokes

Blanket swell: 1 hr.- 0.7%
5 hrs.- 1.5%

The performance of Blanket Wash 36 was not demonstrated at any facilities.

Cost

Cost estimates associated with using Blanket Wash 36 were not developed.

Risk and Exposure

Dermal Exposure: Margin of exposure calculations indicate concern for petroleum distillate hydrocarbons and very low concern for propylene glycol ethers. However, the hazard value for petroleum distillate hydrocarbons is based upon an inhalation study. Risks for other chemicals in this formulation could not be quantified due to the unavailability of hazard values. Structure-activity analysis indicates a moderate hazard concern for aromatic hydrocarbons due to the possible presence of carcinogenic compounds. Risks from fatty acid derivatives are expected to be low based on structure-activity predictions of poor absorption and low toxicity.

Inhalation Exposure: Margin of exposure calculations indicate very low concern for petroleum distillate hydrocarbons and propylene glycol ethers. Due to negligible exposure, the fatty acid derivatives present no concern. Risks from aromatic hydrocarbons could not be quantified but are expected to be low due to low exposure.

Flammability: Low risk

Environmental: No measured risk

Regulatory Concerns

The following table indicates which chemical categories present in this blanket wash contain chemicals that may trigger specific federal environmental regulation.

Chemical	CWA	CAA	CERCLA	SARA 313	RCRA	OSHA
Hydrocarbons, aromatic	X	X	X	X	X	X

Blanket Wash Formulation 37

Composition:
Water
Hydrocarbons, petroleum distillates
Hydrocarbons, aromatic

VOC Content: 14%; 1.0 lbs/gal
Flashpoint: 82°F
pH: 3.9

Performance

Wipability: wet ink- 5 strokes
dry ink- 8 strokes

Blanket swell: 1 hr.- 3.0%
5 hrs.- 3.0%

The performance of Blanket Wash 37 was demonstrated at two facilities. Facility 3 based their performance evaluation on a sample size of 17 blanket washes and printed with conventional inks. This facility noted that longer drying time was required with the substitute wash than with the baseline and standard facility washes. The performance was rated as good and fair on light and medium coverages, respectively. The press operators had no problems with the substitute wash.

Facility 4 based their performance evaluation on a sample size of six blanket washes and printed with conventional inks. This facility found that the substitute wash worked well initially but caused paper breakup due to blanket tackiness. Use of the substitute wash was discontinued.

Cost

Performance data indicate a reduced financial cost when using Blanket Wash 37 instead of the baseline. Average costs per wash decreased roughly 13 percent and 7 percent at facilities 3 and 4, respectively. Overall costs per wash decreased due to reduced cleaning time and material use (i.e., press wipes). Compared to the baseline, cleaning times decreased roughly 20 percent at both facilities 3 and 4.

Facility #	Cost/Wash	Cost/Press	Annual Cost*	Baseline Cost*	% Change**
3	$0.48	$1.92	$4,800	$5,500	+13
4	$0.79	$3.16	$7,900	$8,500	-7

* These costs refer to the cost/press/shift/year
** Refers to the percent increase or decrease in cost that this facility would incur if it switched from using VM&P naphtha to using Blanket Wash 37. A "+" indicates an increase in cost, and a "-" indicates a decrease.

Risk and Exposure

Dermal Exposure: Margin of exposure calculations indicate possible concern for aromatic hydrocarbons. Risks for other chemicals in this formulation could not be quantified due to the unavailability of hazard values. The petroleum distillate hydrocarbons present low to moderate hazard concern based on structure-activity analysis.

Inhalation Exposure: Margin of exposure calculations indicate very low concern for aromatic hydrocarbons. Risks for other chemicals in this formulation could not be quantified but are expected to be low due to low exposure and structure-activity predictions of low to moderate hazard.

Flammability: High risk

Environmental: No measured risk

Regulatory Concerns

The following table indicates which chemical categories present in this blanket wash contain chemicals that may trigger specific federal environmental regulation.

Chemical	CWA	CAA	CERCLA	SARA 313	RCRA	OSHA
Hydrocarbons, aromatic	X	X	X	X	X	X

Blanket Wash Formulation 38

Composition:
Hydrocarbons, petroleum distillates
Alkoxylated alcohols
Fatty acid derivatives

VOC Content: 65%; 4.9 lbs/gal
Flashpoint: 230+°F
pH: 5.6

Performance

Wipability: wet ink- 9 strokes
dry ink- 16 strokes

Blanket swell: 1 hr.- 0.0%
5 hrs.- 1.5%

The performance of Blanket Wash 38 was demonstrated at two facilities. Facility 2 based their performance evaluation on a sample size of nine blanket washes and printed with conventional and vegetable-based inks. This facility found that the wash left an oily residue, which caused print quality problems. Use of the substitute wash was discontinued due to poor performance and print quality problems.

Facility 4 based their performance evaluation on a sample size of six blanket washes and printed with conventional inks. This facility found that the wash cut ink satisfactorily. However, use of the substitute wash was discontinued due to print quality problems associated with the oily residue.

Cost

Performance data indicate an increased financial cost when using Blanket Wash 38 instead of the baseline. Average costs per wash increased roughly 100 percent at facility 2 and 30 percent at facility 4. Costs associated with product use (i.e., volume x price) contributed significantly to the higher overall costs of using Blanket Wash 38. Specifically, compared to the baseline, costs associated with blanket wash use increased 400 percent at facility 2 and roughly 260 percent at facility 4 due primarily to Blanket Wash 38's high price. Blanket Wash 38 is priced at $19.00/gallon compared to $5.88/gallon for the baseline.

Facility #	Cost/Wash	Cost/Press	Annual Cost*	Baseline Cost*	% Change**
2	$1.08	$4.32	$10,800	$5,300	+104
4	$1.11	$4.44	$11,100	$8,500	+31

* These costs refer to the cost/press/shift/year
** Refers to the percent increase or decrease in cost that this facility would incur if it switched from using VM&P naphtha to using Blanket Wash 38. A "+" indicates an increase in cost, and a "-" indicates a decrease.

Risk and Exposure

Dermal Exposure: Risks for this formulation could not be quantified due to the unavailability of hazard values. The fatty acid derivatives and alkoxylated alcohols are expected to present low risk based on structure-activity predictions of poor absorption and low or low to moderate toxicity. Petroleum distillate hydrocarbons present low to moderate hazard concern based on structure-activity analysis.

Inhalation Exposure: Due to negligible exposure, the fatty acid derivatives present no concern. Risks for petroleum distillate hydrocarbons could not be quantified but are expected to be low due to low exposure and structure-activity predictions of low to moderate toxicity.

Flammability: Low risk

Environmental: No measured risk

Regulatory Concerns

None of the chemical categories present in this blanket wash contain chemicals that may trigger specific federal environmental regulation.

Blanket Wash Formulation 39

Composition:
Water
Hydrocarbons, petroleum distillates
Propylene glycol ethers
Alkanolamines
Ethylene glycol ethers

VOC Content: 37%; 2.9 lbs/gal
Flashpoint: 155°F
pH: 9.2

Performance

Wipability: wet ink- 7 strokes
dry ink- 10 strokes

Blanket swell: 1 hr.- 1.5%
5 hrs.- 3.0%

The performance of Blanket Wash 39 was demonstrated at two facilities. Facility 5 based their performance evaluation on a sample size of 32 blanket washes and printed with conventional inks. This facility found that the wash cut ink well and rated its performance as good overall. However, the substitute wash did not dry as quickly as the baseline wash and left an oily residue on the blanket. In addition, the product did not work well on rollers.

Facility 8 based their performance evaluation on a sample size of five blanket washes and printed with conventional inks. This facility noted that the wash did not cut ink well and, thus, required extra time and effort to clean the blankets. In addition, it was difficult to get the wash to soak into rags, and the wash left an oily residue on the blanket.

Cost

The results of the performance demonstration indicate an increased financial cost when using Blanket Wash 39 instead of the baseline. Costs at facilities 5 and 8 increased roughly 25 percent and 45 percent respectively when using Blanket Wash 39 instead of the baseline. Performance results indicated roughly a 40 percent increase in cleaning time at both facilities 5 and 8. Despite a 30 percent decrease in the average quantity of blanket wash used, the costs associated with product use (i.e., volume x price) did not vary between Blanket Wash 39 and the baseline. The manufacturer's price for product 39 is $12.35/gallon compared to $5.88/gallon for the baseline product.

Facility #	Cost/Wash	Cost/Press	Annual Cost*	Baseline Cost*	% Change**
5	$0.69	$2.76	$6,900	$5,500	+25
8	$0.80	$3.20	$8,000	$5,500	+45

* These costs refer to the cost/press/shift/year
** Refers to the percent increase or decrease in cost that this facility would incur if it switched from using VM&P naphtha to using Blanket Wash 39. A "+" indicates an increase in cost, and a "-" indicates a decrease.

Risk and Exposure

Dermal Exposure: Margin of exposure calculations indicate concern for petroleum distillate hydrocarbons, propylene glycol ethers, and alkanolamines as well as possible concern for other propylene glycol ethers. However, the hazard value for petroleum distillate hydrocarbons is based on an inhalation study.

Inhalation Exposure: Margin of exposure calculations indicate very low concern for petroleum distillate hydrocarbons, propylene glycol ethers, and ethylene glycol ethers. However, the hazard value used for propylene glycol ethers is based on an oral study. Due to negligible exposure, alkanolamines present no concern.

Flammability: Low risk

Environmental: No measured risk

Regulatory Concerns

The following table indicates which chemical categories present in this blanket wash contain chemicals that may trigger specific federal environmental regulation.

Chemical	CWA	CAA	CERCLA	SARA 313	RCRA	OSHA
Alkanolamines		X	X	X		X
Ethylene glycol ethers		X		X		

Blanket Wash Formulation 40

Composition:
Hydrocarbons, aromatic
Hydrocarbons, petroleum distillates
Fatty acid derivatives
Ethoxylated nonylphenol

VOC Content: 52%; 3.8 lbs/gal
Flashpoint: 155°F
pH: 4.8

Performance

Wipability: wet ink- 5 strokes
dry ink- 10 strokes

Blanket swell: 1 hr.- 1.5%
5 hrs.- 3.0%

The performance of Blanket Wash 40 was demonstrated at two facilities. Facility 1 based their performance evaluation on a sample size of six blanket washes and printed with vegetable-based inks. This facility considered the performance of the wash to be good. The facility noted that when the wash was diluted with water, it left a residue. There was no residue when the wash was used full strength.

Facility 10 based their performance evaluation on a sample size of 20 blanket washes and printed with conventional inks. This facility found that the wash cut ink well and rated its performance good. The facility noted that the wash required slightly more effort when coverage was heavy.

Cost

Performance data indicate mixed results in the performance of Blanket Wash 40. Compared to the baseline, average costs increased roughly 35 percent at facility 1 but decreased 4 percent at facility 10. The higher cost experienced by facility 1 is attributable to Blanket Wash 40's higher price as well as an increase in the average number of press wipes used. The average quantity of blanket wash used by facility 1 is 2.5 ounces for both the alternative as well as the baseline; however, costs associated with blanket wash use (i.e., volume x price) increased roughly 80 percent due to Blanket Wash 40's higher price. The reduced costs experienced by facility 10 are attributable to a reduction in the average quantity of blanket wash used. Costs associated with product use decreased roughly 30 percent for facility 10.

Facility #	Cost/Wash	Cost/Press	Annual Cost*	Baseline Cost*	% Change**
1	$0.79	$3.16	$7,900	$5,900	+34
10	$0.87	$3.48	$8,700	$9,100	-4

* These costs refer to the cost/press/shift/year
** Refers to the percent increase or decrease in cost that this facility would incur if it switched from using VM&P naphtha to using Blanket Wash 40. A "+" indicates an increase in cost, and a "-" indicates a decrease.

Risk and Exposure

Dermal Exposure: Margin of exposure calculations indicate concern for petroleum distillate hydrocarbons and very low concern for ethoxylated nonylphenol. However, the hazard value for petroleum distillate hydrocarbons is based upon an inhalation study. Risks for other chemicals in this formulation could not be quantified due to the unavailability of hazard values. Structure-activity analysis indicates a moderate hazard concern for aromatic hydrocarbons due to the possible presence of carcinogenic compounds. Risks from fatty acid derivatives are expected to be low based on structure-activity predictions of poor absorption and low toxicity.

Inhalation Exposure: Margin of exposure calculations indicate very low concern for petroleum distillate hydrocarbons. Due to negligible exposure, fatty acid derivatives and ethoxylated nonylphenol present no concern. Risks from aromatic hydrocarbons could not be quantified but are expected to be low due to low exposure.

Flammability: Low risk

Environmental: Aquatic species risk due to the presence of ethoxylated nonylphenols.

Regulatory Concerns

The following table indicates which chemical categories present in this blanket wash contain chemicals that may trigger specific federal environmental regulation.

Chemical	CWA	CAA	CERCLA	SARA 313	RCRA	OSHA
Hydrocarbons, aromatic	X	X	X	X	X	X

References

1. Abt Associates Inc., Cambridge, MA. Telecon with Schuler, Scott, Printing Industries of Minnesota. November 29, 1995a.

2. Abt Associates Inc., Cambridge, MA. Telecon with Kim, Eva, Printing Industries of Illinois. December 5, 1995b.

3. Abt Associates Inc., Cambridge, MA. Telecon with Dave Dunlap, Uniform and Textile Service Association. July 24, 1995c.

4. Abt Associates Inc. 1993. The Medical Costs of Five Illnesses Related to Exposure to Pollutants. Draft Report.

5. Krupnick, Alan J., et al. 1989. Valuing Chronic Morbidity Damages: Medical Costs and Labor Market Effects. Draft Final Report on EPA Cooperative Agreement CR-814559-01-0. Resources for the Future.

6. Mishan, E.J. Cost-Benefit Analysis. Praeger Publishers. New York. 1976.

7. OTA, Office of Technical Assistance, Toxics Use Reduction Case Study: VOC Reduction at Hampden Papers Inc., Commonwealth of Massachusetts, Office of Technical Assistance, no date.